629.05
V. 2 AUTOMOBILES

THE
MOTOR AGE

THE AUTOMOBILE AUTHORITY OF AMERICA

VOL. II. CHICAGO, MARCH 15, 1900. NO. 1.

ENTERED AT THE CHICAGO POST OFFICE AS SECOND-CLASS MATTER.

THE MOTOR AGE is published every Thursday by THE CYCLE AGE COMPANY, at 324 Dearborn St., Chicago.
Eastern Office: 1426 and 1427 American Tract Society Building, 150 Nassau Street, New York City.
Subscription price in the United States, Canada, and Mexico, $2.00 per year; foreign countries (in postal union), $4.00 per year, payable invariably in advance.
Advertising rates on application. Copy for changes in advertisements must be in hand the Friday previous to publication to insure insertion.

LEADING CONTENTS

PAGE

Dangers in the Industry—A parallel between the motor vehicle industry and the bicycle business ten years ago. 1

Novelties in Motor Bicycles—An illustrated description of some American and foreign models. 4

Electric Ignition for Gasoline Engines—A description of the various methods employed. 8

The McInnerney Generator—An illustrated description of a new and successful device. . 11

An Ancient Motor Vehicle—An illustrated description of a carriage in 1800. . . . 13

French Racing Season Opens—Events at Pau where Rene de Knyff breaks all records. 14

PAGE

News of the Motor Industry—Waltham Mfg. Co.'s plans; news from many other sources. . 16

Problems Worked Out—A digest of all that is valuable in the patents issued the past week. 20

Complete Running Gear—An illustrated description of a running gear ready for reception of motor and body. 24

Belgian Duryea Carriage—An illustrated account of an American vehicle in Belgium. . 25

New York News Letter—All the interesting happenings in Gotham. 27

Minor News and Comment—Occurrences of the motor vehicle world gleaned from many sources. 28

DANGERS IN THE INDUSTRY

A PARALLEL DRAWN BETWEEN THE EARLY DAYS OF BICYCLE MANUFACTURING AND THE MOTOR VEHICLE BUSINESS OF TO-DAY—THE LESSON THAT IS TAUGHT

In very many respects the motor-vehicle industry presents the same aspect, to-day, that the bicycle business did ten years ago, at the time when the safety bicycle—the style in universal vogue at the present time—and the pneumatic tire, were being introduced.

It may be as well to say, at the outset, that this statement is not made because the editor of the Motor Age harbors the mistaken idea that has been advanced in numerous other quarters, that the motor-vehicle business is the legitimate successor of the bicycle business. He realizes very fully that the automobile industry is a business by itself, and, at the same time, he feels that he would be a poor exponent of that industry, if, having seen the two lines of business in their infancy, he should fail to note an analogy between them or fail to see a lesson for motor-vehicle builders in the failings of the builders of bicycles. He is no iconoclast or grumbler, but he does believe it worth while to sound a warning and to point out at least one of the causes of failure that lie ahead.

To resume, up to ten years ago, the bi-

cycle could not be said to be much, if anything, more than a mere toy, and its manufacture was confined to a very few firms who were obliged to make practically everything that went into the machines they marketed.

Change in Bicycle Business

With the advent of the safety type, and, just a little later, of the pneumatic tire, the bicycle became a vehicle which promised so much in the way of speed and comfort, as to make it evident that it was to become one of the most popular means of finding pleasant exercise, combined with healthful diversion from business cares, and also promised much in the way of providing a means of locomotion that was so economical, speedy and practical, as to make it certain that there was a great field of usefulness before it.

Many New Manufacturers

At that period, then, a great number of firms embarked in the business, all assured of immense profits. They figured the value of the various parts that went to make up the bicycle and discovered, that, by making them in quantities, the cost was not great and that the total cost of a bicycle was very small, compared with the retail price—so small, in fact, that, after setting aside a liberal appropriation for advertising and after giving liberal discounts to agents, there still remained a margin of profit so large as to make the investment in the necessary factory and machinery for a bicycle plant appear to be one that would return profits almost beyond the dreams of avarice.

Many Unforeseen Obstacles

But there were countless features to the business which were not taken into consideration by the very large majority of the embryo bicycle manufacturers. It may not be amiss to briefly sketch some of those features. One of them was the difficulty of getting the proper materials at the proper time. This wrecked many a concern. Another was that of not having properly trained mechanical men in the shops. This was a prolific source of failure. Promiscuous giving of credits where the margins appeared so large as to justify unwonted risks was another stumbling block. A failure to understand the proper methods of marketing a new and little understood article was still another source of trouble, and very grave trouble, too.

Did Not Keep Posted

Each manufacturer was too intent on the none too easy task of producing an article that would be up to the standard of the day, to pay much attention to what his competitors were doing. Too little attention was paid to the organs of the trade. There were many instances in which makers wasted time and money on trying to perfect and sell bicycles in which was embodied some already exploded device. Much of this failure to watch the progress of business competitors was due to the multiplicity of small problems which met the manufacturer in trying to make everything, or nearly everything, that went into the completed machine.

Details Caused Trouble

Indeed, this attempt to do everything was the source of endless troubles which have resulted in the total extinction of almost all the bicycle makers of less than a decade ago. Of the scores who were in the business at that time, with excellent prospects for success—were the pitfalls avoided—the number that remain today, can be numbered on the fingers of one hand. It is a sorry condition to consider, but it is one from which a lesson may be drawn to the benefit of the automobile makers of 1900.

Parts Makers Spring Up

As has already been said, one of the greatest causes of failure was the attempt to make everything that goes into a bicycle in one factory. This, in the early days of the bicycle, was, in a large degree, obligatory, on account of the newness of the business and the inability to buy parts or to secure deliveries after they were bought. As the business grew, makers of parts sprung up all over the country, but many of the makers were too slow to avail themselves of the ability to buy the complete parts, because, forsooth, they had expensive machinery in their plants for the very purpose of making those parts. They finally learned, however, one and all, that they could

buy cheaper than they could manufacture, and that, by buying, they avoided a number of other difficulties, which, in many cases, was of more moment than the saving in cost of parts.

Except for the facts, first, that the motor-vehicle occupies a more favorable position in public estimation than the bicycle did ten years ago, and, second, that it is a vastly more complicated piece of mechanism, the motor-vehicle business of today and the bicycle business of a decade ago are in very much the same condition.

The Lesson

The lesson to be learned from the bicycle business is this:

Do not try to do too much.

The building of a motor-vehicle is, at best, a sufficiently complicated task without making it more than necessarily so. To build a good boiler and engine is sufficient task for any concern, unless it be one of extraordinary magnitude. The same is true of building a gasoline engine or of making an accumulator.

It would appear to the thinking man that the making of a good accumulator, a task on which the maker has doubtless spent years of experimental labor and research, should be enough, without attempting to build a carriage around it, with all the details incident to a self-propelled vehicle. There is future enough before the firm that can furnish the accumulator.

Samples of Folly

On the other hand it is equally foolish for the man who is capable of building a carriage that is correct in all of the numerous mechanical details that are absolutely necessary in a carriage that is to furnish its own motive power, to further burden himself with the task of perfecting and making the motor—be it of whatever type it may. Success comes with concentration and concentration cannot be reached when there is an everlasting multiplicity of detail to which attention must be given.

It may not be true, today, that small faults will damn an otherwise superior vehicle, but it will be true before so very long. The man who does not fail in small things is the one who does not attempt to do them all himself.

What, then, is the use of including any details that can be avoided, in making a motor-carriage for the market?

In many respects the industry is more fortunate than was the bicycle business in the early days. It is in better public favor. On the other hand, there are even more aspirants for the public's money than there were in the early days of the bicycle business and there is bound to be a corresponding number of failures unless the makers of automobiles are possessed of superior brains or heed the lesson afforded by the bicycle.

Parts Can be Secured

In addition to being more popular than the bicycle was, there is a far better chance for the automobile manufacturer to secure the component parts of his vehicle, without making them himself. The bicycle business, with its pneumatic tires, its wood and steel wheel rims, its steel tubing and its forged connections, has paved the way for securing certain parts without the complication or expense of making them. On the other hand, the carriage industry, already hoary in its antiquity, and itself a business of parts, points out the road to go for other parts. There is no reason why the bodies or wheels should be made, no reason why the painting and upholstering should be done in an automobile factory.

New Complications

The motor-vehicle is more than a bicycle and it is more than a carriage. It has complications that are foreign to both of them and those complications are enough for any manufacturer embarking in a strange business to undertake. Let him avoid them. He can now buy almost everything that goes to make up a motor-vehicle and can assemble it, which is a sufficiently difficult task and devote the rest of his time to the selling of the product. This course requires the least investment, involves the least risk, gives the most rapid turn-over of what money is invested, and, finally, leads to success by the straightest and easiest road.

NOVELTIES IN MOTOR-BICYCLES

DESCRIPTION OF THREE SELF-PROPELLED CYCLES, BELONGING TO THE CLASS THAT IS BOUND TO BECOME IMMENSELY POPULAR IN THIS COUNTRY, AS WELL AS ABROAD

It is inevitable that the motocycle in the varying forms in which it has already been seen and in which it is bound to be seen in the future, will be one of the greatest factors of the automobile business, if, indeed, not the greatest factor.

Most of the readers of the Motor Age are fairly familiar with the motocycle in its tricycle form with its "avant-train"—or attachment which converts it from a single-seated tricycle to a two-seated quadricycle. Last week two forms of the tricycle were described in which two persons were seated side by side. This week attention will be turned to the motor-bicycle. Of the three described, two are of American make while the third hails from Bohemia.

STEFFEY MOTOR-BICYCLE.

The Steffey Motocycle

The Steffey motor-bicycle is a distinctively American machine, made by the Steffey Mfg. Co., of San Diego, Cal., from the designs of F. E. Steffey. The accompanying illustrations will give an excellent idea of the compactness of the motor mechanism. In regard to the details the company writes as follows:

"Our motor is a small, four-cycle gasoline engine, weighing about twenty-five pounds and developing one horse-power. The engine occupies a space of 15½ inches in length by a thickness of 3½ inches, being so very thin that it can be set in the diamond frame of a bicycle without interfering with the pedaling, as will be seen by reference to the accompanying photograph.

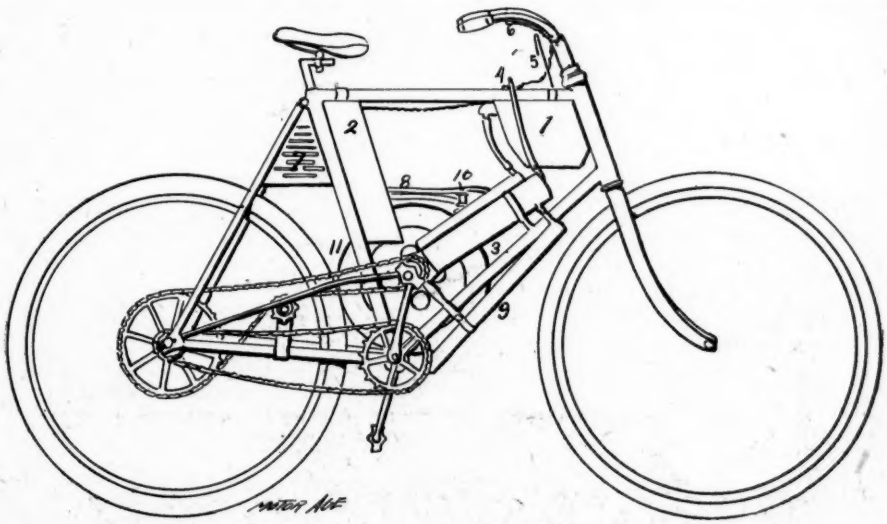
Fitted to Any Bicycle

"The engine can readily be clamped within the frame of any bicycle and still leave room within the frame for other accessories, such as gasoline tank, batteries, etc.

"We furnish motors complete with all attachments, so that they can be fitted to any bicycle with little trouble. We also furnish the bicycle complete with motor mounted on it. The motor can be used either with outside casing, as shown in the photograph, or without, as indicated

in the diagram, as may be desired by the rider.

"The motor is entirely safe. Electric ignition is employed, utilizing a primary coil. Radiation flanges are used for cooling. The engine is remarkably free from vibration and noise, running almost as steadily and quietly as an electric motor. A small electric button on the handle bar permits of the bicycle being stopped quickly by switching off the current from the igniter.



MECHANISM OF STEFFEY MOTOR BICYCLE.

An Excellent Muffler

"The muffler weighs but a few ounces and is a perfect silencer and gives no back pressure. By a careful test of the power of the engine, both with and without muffler, no difference in power can be detected.

"We use an especially designed carburettor which will evaporate the lower grades of gasoline entirely away, without the application of heat from the exhaust of the engine. It contains no moving parts and has nothing that can become deranged.

"Every part of the motor mechanism, such as crank, gears and valves, is enclosed to exclude dust and dirt.

"The bicycle can be started by a few turns of the cranks, after which it becomes entirely automatic and requires only the regulation of the speed by means of a small lever back of the handlebar. The speed is changed by varying the quantity of the explosive mixture admitted to the cylinder or by varying the time of ignition.

"The bicycle, when so ordered, will be fitted with coaster brake attachment, to enable the rider to hold the pedals in a stationary position, or, by a slight backward turn on the pedals, to apply the brake.

"The bicycle, fitted with entire motor mechanism, weighs from fifty to sixty pounds. The motor with batteries, carburettor, etc., weighs twenty-five to thirty-five pounds.

"We are preparing to equip our machines with an electro-magnetic igniting device which will do away with the care and expense of batteries.

Light Bicycles Available

"Owing to the light weight and small size of our motor, it does not require the use of an essentially heavy bicycle. The bicycle can be run at the rate of twenty miles an hour and can climb ten percent grades. On ordinary roads it has enough power to pull another bicycle with it.

"The motor can be removed or replaced, after being attached, in a few minutes and with the use of only a screw driver,

thus enabling the rider to have a motocycle and an ordinary bicycle in one."

Description of Parts

In the diagram of the bicycle, a glance will show the reader the disposition of the various parts of the mechanism. The water jacketed motor is indicated at 3, having on one side the fly wheel 11, and on the other a small sprocket, which is connected to the large auxiliary driving-sprocket on the back wheel by a chain passing over a sprocket guide-wheel supported upon the bicycle frame. The tank, 1, contains the gasoline, while in the box, 2, is placed the ignition battery. This is connected by flexible cord to the igniter of the motor and to a push button, 6, located under one of the handles of the handle-bar. The motor is lubricated from the oil cup, 10, and is cooled by water from the tank, 7, placed under the seat, which circulates through the pipes, 8, to and from the water jacket. The tube, 9, is a muffler.

Starting the Machine

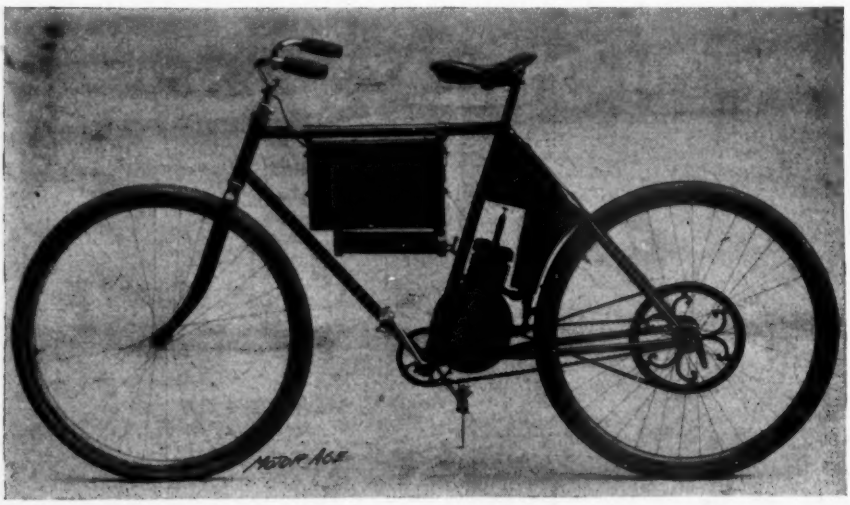
In starting the machine, the compression lever, 4, is released, then the rider mounts and drives ahead by giving the pedals two or three revolutions in the ordinary way. He immediately throws on the compression lever, 4, and presses the button, 6, whereupon the motor starts and drives the machine at a good rate of speed. The speed may be regulated by moving the wire hook, 5, which controls the air mixture while the bicycle can be quickly and effectually stopped by simply ceasing to press the igniter circuit button, which will cause the compression of the unexploded charges to powerfully brake the motor.

Lear's Motocycle

Another motor-bicycle of American make is that of Oscar S. Lear, of Columbus, Ohio. The accompanying illustration shows the general appearance of the bicycle. It was on exhibition at the spring opening of Mr. Lear's bicycle store recently and attracted a vast deal of attention, quite eclipsing the bicycles which were not fortunate enough to have the motor attachment.

The Motor

The motor employed by Mr. Lear is a gasoline engine of the two-cycle type. It develops one-half horsepower. The transmission is by belt to the large pulley on the rear wheel. The rear hub is a New Departure coaster-and-brake hub. After the bicycle is put into motion by means of the pedals, the power is communicated to the motor and as soon as the motor takes hold of the work, the pedals remain at rest.

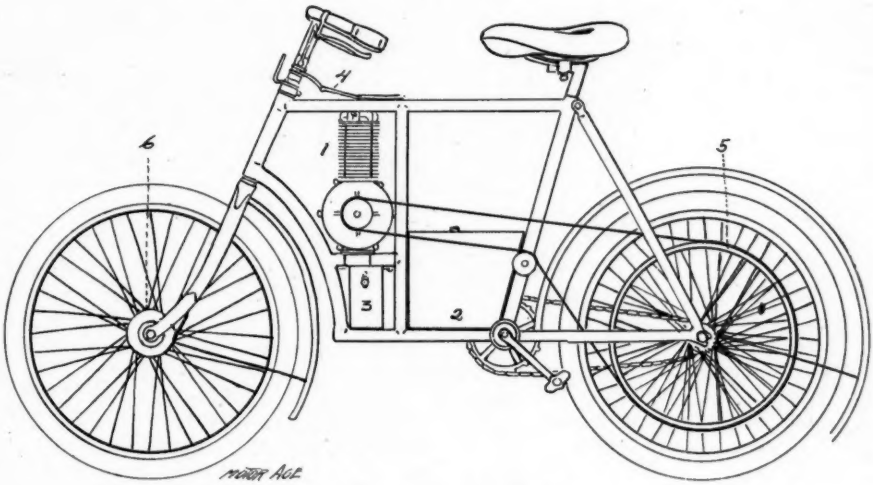


LEAR'S MOTOR BICYCLE.

The tread of the bicycle is increased only one inch by the motor mechanism.

The chain from the front sprocket wheel goes between the engine and fly wheel and the transmission sheave from the engine to the rear wheel, on the opposite side, between the flywheel and engine.

The frame is four inches longer than that of the ordinary bicycle. The ignition is electric. The cut fails to show a muffler with which the bicycle has not yet been equipped but which will shortly be added.



"REPUBLIC" MOTOR-BICYCLE.

A European Machine

Among the European makers of motorbicycles is the firm of Laurent & Klement of Fungkirchen, Bohemia. Last year this firm put on the market a motor-bicycle, illustrated in the Motor Age several months ago, in which the motor was carried on the front forks and the driving transmitted through the front wheel. This arrangement was found to be entirely unsatisfactory, owing to the great amount of weight which had to be carried by the forks, resulting in their frequent breaking. The hot tube ignition which was used, was also found to be dangerous and unsatisfactory.

Peculiar Style of Frame

Accordingly the firm has entirely changed their model, both in the matter of motor-mechanism and in appearance.

In the new model, called "The Republic," the tube ignition has been changed to electric, obtained from an electro-magnetic battery. The motor is set in the frame of the bicycle which is built after lines which are revealed by the illustration. Steel tubing of large diameter and heavy gauge is used. The front forks are made particularly heavy. The motor 1 sets in the fore part of the frame. The gasoline tank 2 connects with the carburettor 3. The lever 4 controls the admission of explosive mixture to the motor and through it the speed can be varied or the engine stopped altogether.

Power Transmission

The power is carried from the motor shaft to the pulley 5 on the rear wheel by means of a round leather belt. An idle wheel serves to keep the belt out of the way of the pedals and at the same time to maintain it at the proper tension. The brake 6 is of the band variety and works on the front wheel. The rear wheel is fitted with a coaster attachment, so that the pedals may be used to put the bicycle and motor into motion and then allowed to run free. The motor is of 1¼ or 1¾ horsepower, as desired.

The wheels are fitted with two-inch pneumatic tires and the saddle is fitted with large and easy springs. The bicycle is said to have accomplished as high a speed as thirty-five miles an hour on the track, but is geared to a maximum speed of twenty miles an hour for use on the road.

INDEX

ELECTRIC IGNITION FOR GASOLINE ENGINES

A DISSERTATION BY P. P. NUNGESSER ON ELECTRIC IGNITION, DESCRIBING THE VARIOUS METHODS EMPLOYED AND THE CAUSES CONTRIBUTING TO SUCCESS OR FAILURE

In the early days of gas and gasoline engine construction the only method of ignition was what was commonly known as the hot tube. The tube which entered the combustion chamber or cylinder was heated red hot by a gas or gasoline burner, which necessitated the maintaining of an open flame outside of the engine cylinder. The many dangers accompanying this form of ignition, especially on gasoline engines, made it in some localities extremely hazardous, together with the uncertainty as to the period in which the ignition would actually take place due to high or low compression.

Necessary Conditions

Under favorable conditions, such as tight fitting cylinder rings on the piston head and perfect fitting valves, whereby high compression was obtained and the explosive mixture forced into the hot tube to a point where the tube was at an igniting temperature, the ignition would take place at a proper period of the stroke, and high efficiency was the result.

Causes of Failure

When the opposite conditions prevail, such as a slight leakage at the rings on the piston head or in the valve seats, lower compression exists, causing a loss in power. This, together with the frequent breaking of the hot tubes due to the oxidation, and other uncertainties of this method of ignition, soon led the inventors and manufacturers of gas and gasoline engines to seek a more reliable means of ignition, free from the many dangers accompanying the use of the hot tube.

Failure of Electric Ignition

This was found in the application of the electric igniter to the gas and gasoline engines. Yet many builders of gas and gasoline engines have frequently met with difficulties and sometimes failure in their efforts to obtain satisfactory results in the electrical ignition under the various conditions.

This is due to the many details which are overlooked and regarded by many builders as unimportant. The great strides that have been made in the perfection of the gas and gasoline engine, especially adapted for automobile service as well as all forms of stationary motive power, has made this a very important industry, the growth and magnitude of which can hardly be conceived by the average mind not directly or indirectly interested in this progressive industry.

Improvement in Igniters

The high state of perfection met with to-day in this important source of mechanical energy, as applied in its comparatively new field of usefulness on automobiles and pleasure yachts, is due in a measure to the great improvement made in the electric igniters, spark coils and batteries. Perfect ignition is the most important factor in producing successful results. Engines which have igniters that combine durability with simplicity of construction have met with the greatest success in the hands of the average operator.

Classes of Igniters

Another leading feature is the cost of maintenance. The writer will endeavor to explain the most successful igniting devices in use at the present time:

They consist of two distinct classes: the primary and the secondary, commonly called the jump spark igniter. The primary igniters, which are by far the most largely used by the engine builders of this country, are constructed in three distinct forms.

Striking Contact

The first is known as the striking or make and break contact points which are made to pass through the side of the cylinder or through the cylinder head into

the combustion chamber. The movable point which strikes against the stationary point is actuated by a suitable mechanism on the outside of the cylinder. This mechanism is usually so arranged that ignition can be produced at the highest point of compression, or at the point where the highest efficiency is obtained with the combustible mixture contained in the combustion chamber.

Wipe Spark Igniter

The second form of primary ignition, commonly known as the rotary or wipe spark igniter,is not so largely used as the striking or make and break type just described. One objectionable feature that the writer has not yet seen successfully overcome in the rotary type is the great wear in the sliding contact points. It is true this form of ignition produces a much larger spark with the same consumption of battery power than the striking or make and break igniter, but the frequent attention that this form of sliding contact ignition requires to keep it in perfect condition will prevent it from ever coming into so popular favor as the striking or make and break ignition.

Inside Igniter

The third form of primary ignition used is the make and break igniter known as the inside igniter. This igniter is constructed by passing the insulated stationary rod through the side wall of the cylinder, or through the cylinder head. The movable part of this igniter is attached to the piston head inside of the cylinder, and when the piston head compresses the explosive mixture to the highest point of compression, the igniter, which has been brought in contact by the backward motion of the piston, is separated by the return movement of the piston head, thereby igniting the mixture.

There are many other forms of primary ignition in use, but those described above are the most largely used in this country.

Jump Spark Igniters

The second class of igniters, commonly known as the jump spark igniters, have only one form of construction. This is an insulated plug through which the wires from the induction or secondary coil pass to the inside of the combustion chamber. The two wires which pass through the insulated plug are usually spaced from one-half inch to five-eighths inches apart in passing through the plug, and curved inward, or toward each other, to allow from one-eighth inch to five-sixteenth inches air space through which the spark passes from the positive to the negative wire. It will be noticed that no movable parts exist in this form of ignition. When the battery is closed by suitable insulating plates on the revolving shaft of the engine, a spark is produced in the combustion chamber or cylinder.

Insulation Necessary

The insulating plugs used for this secondary current, or jump spark ignition, must necessarily have very high insulating properties. They are usually made of lava (which is a composition of soapstone), or are made from mica, which has high insulating properties.

The Ruhmkorff, or induction coil, as it is sometimes called, which is used to produce the jump spark, is constructed with a primary coil, of course, or heavy wire having a soft iron core. Over the primary coil are wound a great many layers of very fine insulated copper wire having no metallic connection with the wires of the primary battery coil.

Induction Coils

When a battery current passes through a primary coil it magnetizes the iron wire core, and also charges the tin foil condenser which is usually placed in the base of the coil. When the battery circuit is closed a current of very high voltage is produced by the induction in the secondary coil, the ends of which terminate in the ignition plug inside of the combustion chamber. This high voltage causes a spark to pass from the positive to the negative wire inside of the combustion chamber.

Requirements of Battery

To ignite an engine successfully with any of the above forms of ignition, a battery of great strength and durability is absolutely essential, and is by far the most economical to use. These requirements are only found in a closed circuit battery that is manufactured expressly

for high speed engines, such as used on automobiles and pleasure yachts. Practical tests and demonstrations on automobile and yacht engines have proven that a battery having from 4½ to 6 volts, or ¾ to 1 volt per cell, to be the correct voltage to use.

The battery should have a very low internal resistance and have an ampherage or current discharge of from eight to sixteen ampheres on closed circuit measurement. A closed circuit battery, such as the Nungesser number one and number five portable batteries, which are made expressly for this service, will meet the above requirements.

About the Spark Coil

Too much cannot be said about the use of a suitable primary spark coil in connection with any of the primary igniters. It has required many tests to determine the correct resistance to have in the coil. If the resistance is too low, the coil will allow too large a flow of current from the battery, thus wasting very much of the battery power, also frequently destroying the platinum points on the igniter.

To obtain the best results, from 1½ to 2 ampheres should be the limit of discharge through the coil. Coils are now wound for four, six and eight cells, as the case may be.

Wasting of Current

Since the early days of electrical ignition many forms of spark coils have been used; in fact, any coil that would produce a large spark was considered the correct coil to use irrespective of the great waste in battery power. Many spark coils in use to-day are wasting as much current as is required to successfully ignite the engine. This is due to the very low resistance of the spark coil, which allows twice the ampherage or current to flow through the coil when the circuit is closed as is necessary for successful ignition. This waste of current is prevented by having the correct resistance in the coil so as to produce a reliable spark and prevent any waste in the battery power. It has been found from actual tests on modern engines that by having a coil of the correct resistance, the life of the battery has been doubled.

Another great improvement in ignition and saving in battery power was effected by discarding the old style long coils, which were eight, ten and twelve inches in length. An erroneous idea existed that a long coil would produce a larger spark, but practical experience and tests have shown that a primary spark coil best suited for high speed engines, such as used on automobile and pleasure yachts, should not exceed six inches in length over all. The eight, ten and twelve inch coils will not, with the same consumption of battery power, magnetize and demagnetize as rapidly and completely as the six-inch coil; consequently the latest improved primary coil has an extra large diameter core, which is composed of number twenty annealed Swedish iron wire, reannealed after cutting to six inches in length.

A coil having a core made of this grade of iron and with this degree of care will magnetize and demagnetize instantaneously. This enables the engine builders to provide for only a short duration of close; that is, allowing the circuit to remain closed only half as long as would be required to produce the same results with a twelve-inch coil. It is, therefore, a great economy in battery power to use a six-inch coil, and the results are much more satisfactory.

Waterproofing Coils

Another important feature in the construction of primary spark coils for automobile use is the thorough waterproofing of the spark coil to produce thorough insulation under all conditions met with in portable use. No spark coil, if not proof against dampness and moisture, will give satisfactory service for any period of time; it is, therefore, necessary to have the spark coil thoroughly waterproof.

No form of dry battery should be used for continuous use. All dry batteries and salammoniac batteries are open circuit batteries and only suitable for periodical work. The first cost of a dry battery and salammoniac battery is very low, but its life in heavy service is very short.

Dry Batteries and Dynamos

Dry batteries are sometimes used for starting an engine where a dynamo is

used for continuous ignition. A number of builders are using dry batteries for starting their engines and as soon as the required maximum speed is obtained an automatic switch cuts the battery out of the circuit and closes the dynamo circuit. This is also sometimes accomplished with a two point switch, and the dynamo will then ignite the engine until the speed is reduced. While the dynamo or generator is used the batteries are at rest.

Advantages of Battery

The writer considers a good portable closed circuit battery not only more economical than the dry battery and dynamo combination, but it requires less care, as there are fewer parts to become disarranged in the rough service to which ignition devices are subjected in gasoline propelled automobiles. It is a mistaken idea that dynamos or magneto-generators do not require any attention or repairs. The high speed at which these generators are usually driven produces considerable wear on the movable parts, so much as to have caused them to be abandoned by many of the progressive builders.

Many builders of automobile engines have had difficulties, no doubt, with the many forms of closed circuit batteries. These difficulties are sometimes easily located. A closed circuit battery in which a paraffine oil must be used on the solution should be avoided, as it will be found to give short life and comparatively poor service. This is due to the rough usages in carriages, causing the paraffine oil to coat the elements and interfere with the action of the battery. A perfectly sealed or liquid tight battery does not require any oil to protect the solution from the atmosphere. A battery which may show excellent service in stationary use may be a complete failure in portable use.

Importance of Details

There are no trade secrets about electrical ignition. The degrees of success with which the various manufacturers are meeting depend entirely upon the amount of attention that has been given to the most important details which the writer has endeavored to explain in this article. There are perhaps other causes for success or failure in electrical ignition, but those referred to in this article are from the writer's personal experience and observations, made in the past ten years, or since the development and perfection of the gas engine.

INDEX

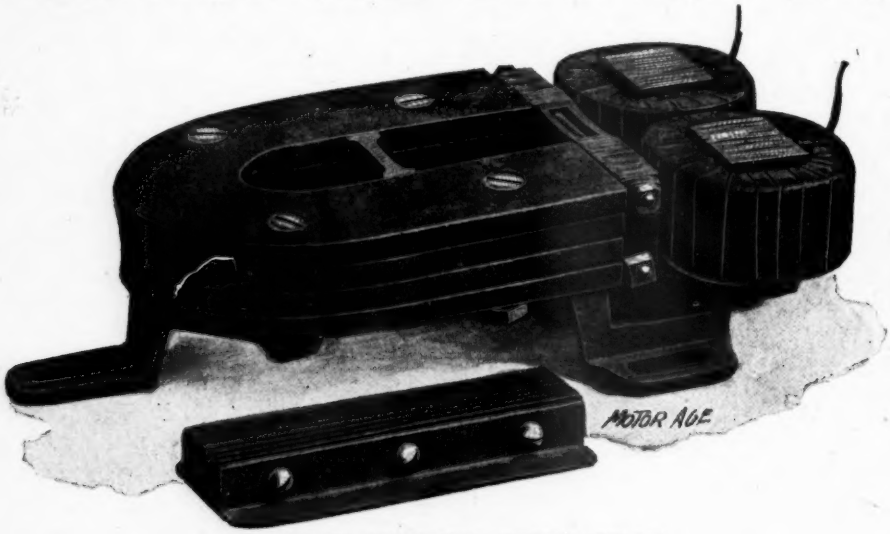
THE McINNERNEY GENERATOR

It has been well said that the best definition of a gas engine is a "spark with an engine built around it." The first gas and gasoline engine to successfully use an electric spark in the United States was built in California and was known as the Regan engine. At that time primary and storage batteries were in the experimental stage and were very unsatisfactory. The use of an electric spark on an engine was one of the greatest incentives to electricians to perfect batteries so as to give sufficient life to furnish at a minimum 150 sparks per minute without the engine missing.

Great improvements have been made in the past few years in this type of battery, and then electricians and inventors gave their attention to sparking dynamos for similar purposes. A number have been put upon the market in the shape of small dynamos which have their objectionable features on account of the high speed at which it is necessary to run them, burning out of the armatures, wearing of the brushes, and difficulty in timing so as to get the spark in the cylinder at the proper moment to give the best results. Realizing all of these difficulties, Benjamin McInnerney, an electrician of

great experience, invented and has since placed upon the market through Thomas Kane & Co., Chicago, what is known as the McInnerney generator, a cut of which is here shown.

It consists of two parts—a permanent magnet and a keeper. The permanent magnet is preferably bolted to a part of the frame and the keeper is attached to the fly wheel, and in the natural revolution of the engine the latter passes within one-sixteenth of an inch of the magnet in such a relative position that a spark is given inside of the engine to ignite the gas. The permanent magnet consist of a series of laminated plates and in contact with each end is a pole piece consisting of a series of laminae which are bent to a U shape, one limb in contact with the end of the permanent magnet and the other limb projecting at right angles to the plane of the permanent magnet and having wound around it a coil of wire which connects with the coil upon the other pole piece and is in circuit with the sparking device. The keeper consists of a series of laminae bolted to the fly wheel at any suitable point.



McINNERNEY GENERATOR—KEEPER BELOW.

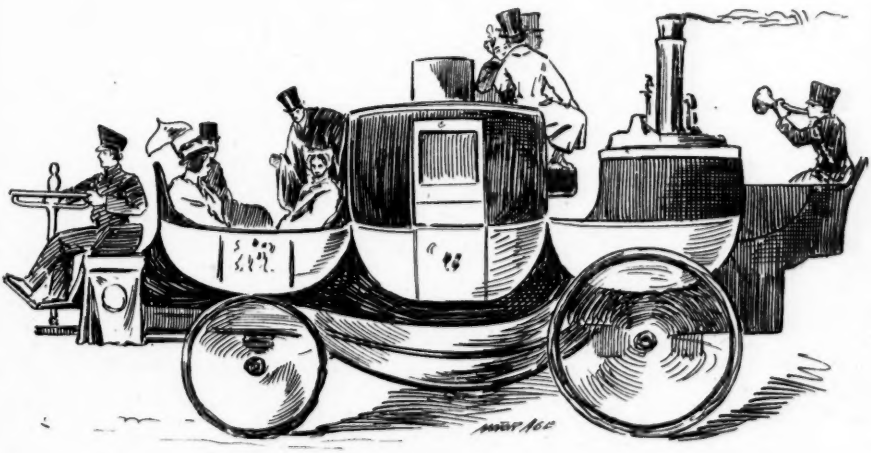
In the operation of the engine the keeper first travels from the toe of the permanent magnet towards the pole end. In consequence of this arrangement there is practically a short circuit of the permanent magnet through the keeper as the latter travels over the magnet, which tends to remove the flux from the pole pieces. This lowers the flux in the pole pieces to the lowest practical extent just prior to increasing it to a maximum, so that the rate of increase is very rapid, and as the generation of the current depends on the rapidity and magnitude of the change currents of much greater energy are secured. As the change takes place during the passage of the keeper across the gap between the pole pieces and the ends of the permanent magnet, the time during which the change is developed can be varied by varying the extent of the gap so as to adapt the generator to engines in which there are variations in the timing of the sparking device.

It will be seen by this description that the McInnerney Generator has no moving or wearing parts and nothing to get out of order. The passing of the keeper over the magnets strengthens them to their maximum point and there is no deterioration in use. It will be seen that the keeper is attached on the fly wheel in such a relative position as to give the spark at the proper time inside of the cylinder. If the engine is constructed with two or more cylinders, an equal number of keepers are required. While there is no change in the construction of the permanent magnet, the generator is so constructed that the coils are waterproof and

the spark is not affected by oil or water. The current given by the generator is sufficient to give a spark to start the engine without the use of the battery at slow speed and as the engine increases in velocity, a larger spark is generated so that it can be used on high speed engines without any deterioration in its life.

AN ANCIENT MOTOR VEHICLE

In the year 1800 a steam carriage, invented by W. H. James, of Birmingham, England, was shown on the roads. It was a fantastic affair, as will be seen from the accompanying illustration, which is reproduced from an old print. The following note is appended to the print:



"The above is a representation of a steam carriage, the invention of Mr. W. H. James, of Birmingham and Thaive's Inn, London, and which is so far completed that it will be ready to start in the course of the ensuing month.

"The weight of the carriage and propelling machinery is two tons, and the estimated power is from fifteen to twenty horses. With this power it is estimated that the carriage will travel at the rate of from eight to twelve miles an hour, carrying six passengers inside and twelve out."

THE FRENCH RACING SEASON OPENS

RENE DE KNYFF ESTABLISHES A NEW LONG DISTANCE RECORD, AVERAGING MORE THAN FORTY-FOUR MILES AN HOUR FOR NEARLY FIVE HOURS

The opening of the European racing season, which has hitherto taken place at Nice, occurred this year at Pau, a repetition of the mismanagement of the races which occurred there last year having been made impossible. The week's automobile sport proved most enjoyable and resulted in Rene de Knyff establishing a speed average which has never before been attained over a like distance.

On the first day the race from Pau to Peyrahorade and back was spoled by a heavy rain, which made the roads extremely heavy, and caused a lot of trouble to the competitors. Many of those who had entered and traveled by road did not arrive in time, with the result that there was only a meager show at the start.

Few Competitors

There were fourteen competitors, divided into five classes. Among the two-seated racing cars there were only three starters—Loraine Barrow, Secrestat and Pascault—the two first named with twelve horsepower motors and the third with a fifteen horsepower. They were sent off at intervals of thirty seconds, and then followed two motocyclists, three four-seated cars driven by Rigby Knowles, A. Clement and Comte Louis de Lasbases, one six-seated car owned by M. Barbereau-Bergeon, and five voiturettes.

H. Mayer, the motocyclist, soon got in front and was leading at Orthez, but at this point he came to grief, his example being immediately followed by Montlet, the other motocyclist. Both had very powerful motors, stated to develop as much as six horsepower, and the accidents were caused by the severe strains put upon the machines by too suddenly applying the brakes. Pascault then took the lead, and easily kept there to the end, returning to Pau thirty-five minutes before the second man, Barrow. Secrestat was close up, but he was overtaken in the last mile by Clement, who beat him for the third place.

The results, for the course of 140 kilometers (87½ miles) were as follows:

Two-seated carriages: Pascault, first, 2:41:44; Barrow, second, 3:15:16; Secrestat, third, 3:18:50.

Four-seated carriages: Clement, first, 3:16:10; Comte Lasbases, second, 3:46:25.

Six-seated carriages: Barbereau-Burgeon, 5:04:50.

Voiturettes: Tart, first, 4:20:20; Schmidt, second, 5:21:40.

The second day was devoted to a motor-vehicle paper chase, for which the course had been laid out by W. K. Thorn, president of the Automobile Club Bearnais, but as a high wind blew away the "scent" no one succeeded in following it for the entire distance of forty kilometers. On the following day took place an automobile exhibition, together with receptions and other social events organized by the promoters.

The Big Event

Then on Sunday was held the big race of the week known as the "southwest circuit," and including Tarbes, Aire, St. Sever, Dax, St. Etienne-de-Bayonne and Orthez. The total distance was 335 kilometers, or 209½ miles. For this event there were thirty-six entries, comprising all the most noted racing chauffeurs. Only five failed to put in an appearance, and the starters were sent off at intervals of half a minute in the following order: Giraud, Rene de Knyff, Hourgieres, Bozon de Perigord, Loraine Barrow, Pascault, Charron, Girardot and Valton. The following motocyclists also started: Marcellin, Beconnais, Rigal, Baras, Osmont, Joyeux, Martin, Villemain, Delisles and Labadie. Among the cars Girard and De Knyff had their sixteen horsepower motors, and the others, with the exception of Pascault, had twelve horsepower engines. Both Charron and De Knyff had abandoned the incandescent tube for electrical ignition, and ball bearings were put wherever possible, while every particle of superfluous weight was sacrificed.

The tricycles were usually fitted with powerful motors, the machines of Marcellin, Rigal and Beconnais being propelled

by motors developing, it is said, from five to six horsepower, while the others varied from three to four horsepower. The engine on Marcellin's tricycle had twin cylinders.

De Knyff Takes the Lead

Almost as soon as the signal was given De Knyff got up his full speed and, bounding after Giraud, who had a start of half a minute, caught him after a few kilometers. They were both traveling at a terrific pace, and on the flat they could scarcely have done less than fifty miles an hour, for De Knyff covered the 34½ miles to Tarbes in the marvelous time of 33½ minutes. Giraud was two minutes behind, and then followed Charron, Giles Hourgieres and Bozon de Perigord. Beconnais, the motocyclist, was the next to pass through Tarbes, with Girardot, Pascault and Marcellin close up. A good many motocyclists failed to reach the top of the hill at Soumoulou.

De Knyff passed through Riscle (56¼) six minutes before the second, Charron, who had got ahead of Giraud. Hourgieres and Bozon de Perigord were still fourth and fifth, and Pascault moved up one through accidents to Girardot and Beconnais.

Many Serious Accidents

Troubles now came thick and fast, for Valton dashed into the gate of a grade crossing and smashed his car, but, fortunately, escaped injury to himself. Then when near St. Sever, Charron's car struck a ridge in the road and went off at a tangent against a tree. The car was completely smashed, but Charron himself got off scot free.

With a strong wind at their backs, the chauffeurs fairly flew over the road, and it was with considerable surprise that the spectators saw the arrival of De Knyff at St. Sever (85½ miles) exactly two hours after the start. Giraud was nine minutes behind, followed at an interval of four minutes by Comte Bozon de Perigord. Loraine Borrow, Pascault and Girardot passed through the town in that order, and then came the motor cyclists, Baras, Marcellin, Osmont and Villemain.

Make Fast Time

De Knyff got to Dax (133¾) at 11:39, having increased his advance on Giraud to twenty-two minutes, and Bozon de Perigord still made a good third. Marcellin, however, had taken the head among the motor cyclists, and passed through Dax at 12:35, in front of Pascault and Girardot.

The turning point for the run home was at St. Etienne de Bayonne (143 miles), where De Knyff arrived at 12:20. There was an interval of twenty-seven minutes between him and Count Bozon de Perigord, who had succeeded in wresting the second place from Giraud. Gilles Hourgieres was fourth, and Marcellin, the motor cyclist, fifth at 1:14.

Have Big Leads

The contest was now virtually over, for, barring accidents, De Knyff and Marcellin had such advances that they were bound to win in their respective categories. At Payrehorade (165½ miles) the leading chauffeur was, indeed, forty minutes ahead of the second man, and Marcellin had now crept up to the third position. The control at Orthez (184½ miles) was reached by De Knyff at 1:24, and Bozon de Perigord followed at 2:02, though, as the latter had neglected to sign at some of the controles, he had run the risk of disqualification. Gilles Hourgieres was now third, and Marcellin fourth at 2:32.

Sensational Arrival

De Knyff's arrival at Pau was a sensational one. He finished at a tremendous pace, and completed the journey at 2:04:27, which, after deducting official stoppages, amounting to seventeen minutes, gave the net time for the 209½ miles as 4:46:57. This represents an average of nearly forty-four miles an hour, which beats all previous records.

The motocyclists came off badly, for about a dozen were left on the road through accidents to their machines, but these failures were compensated for by the success of Marcellin, who covered the distance in the remarkable time of 5:47:14, an average of more than thirty-six miles an hour.

The Results

Racing vehicles: Rene de Knyff, first, 4:46:57; Comte Bozon de Perigord, second, 5:33:52; Gilles Hourgieres, third, 5:51:52.

Motocycles: Marcellin, first, 5:47:14; Delisles, second, 6:21:05; Osmont, third, 6:52:02.

NEWS OF THE MOTOR INDUSTRY

MANAGER GASH OF THE WALTHAM MFG. CO. INTERVIEWED IN REGARD TO MOTOCYCLE BUSINESS—A LARGE DEMAND FOR MOTOR-BICYCLES—OTHER TRADE NEWS

New York, March 10.—W. D. Gash, of the Waltham Mfg. Co., dropped in at the Motor Age New York office to-day and in the course of a chat on the motor cycle game, in which his company is very largely interested from a general riding as well as racing standpoint, let fall some interesting information of the doings and intentions of the Orient people in this direction.

Shipping Rapidly

"We are having a big demand for our autogos," said he. "You know they are our quadricycles convertible into tricycles. We have been shipping of late an average of one a day and will have fully 200 of them out within sixty days. We retail the autogos at $600 and the tricycles at $450. A tricycle buyer, however, can at any time have the autogo attachment by paying the $150 difference in price. In the beginning we followed the French pattern of quadricycle as is used by the Beaumont sisters in their vaudeville act. We have made, however, recently, great improvements, the main one being in the bed of the carriage, which is now a solid piece of aluminum. Instead of the clutch being in the crank hanger, we now have a ball bearing clutch in the rear axle without the need of a ratchet. We are also using the Orient front fork crown and crank hanger.

Facilities for Manufacture

"By the middle of April or the first of May our 1900 bicycle output will be finished and we can then, if necessary, devote our whole factory to motor cycle construction. Hitherto most of our motor work has been tool work; but we have now completed our new tools and will get our forgings and connections direct from the foundry. If necessary, in view of the present increase in demand for autogos and tricycles we can turn out fully 2,000 the coming season.

"There is bound to be a big demand for motor singles. Tricycles are, of course, more convenient for city use, but for city people who incline toward touring and for country town motor cyclists the singles will be more practical, as they can take the paths and beaten tracks in the road, in which only the wheel on one side of a tricycle would run. We retail these singles at $400. In about a month we will have out our new tandems, which will be built on new lines, overhang far back and be very much faster than the old patterns. There will be a lot of motor cycle racing the coming season and the racing men are investing largely in them. Hausman and Rutz have bought one and Frank Waller has ordered two.

"Will our bicycle agents also handle the autogos, tricycles and singles? Indeed they will, for Orient dealers will have the preference in our motor cycle agencies whenever they wish them."

John Wannamaker's Activity

John Wanamaker is an automobile and motor cycle enthusiast from a business as well as a personal standpoint. In New York he has just leased a separate building on Ninth Street, opposite his big store, for their display and sale, while in Philadelphia the motor vehicle department has a conspicuous corner window space on the first floor. He is selling the electric automobiles of the General Electric Vehicle Co. of Philadelphia and the Orient autogos, tricycles and singles of the Waltham Mfg. Co.

Unjust Daily Papers

The motor vehicle industry is beginning to experience the same ignorant, injudicious and unfair treatment at the hands of the daily newspapers in their ill-advised and wrongly informed discussion of cost and retail prices which did so much to hurt the cycle trade. The paper, by the way—the New York Herald—which was the main offender against the cycle trade in this matter, recently displayed the same injurious ig-

norance as to the cost of automobile and motocycle construction the other day when it credulously announced that a notorious automobile concern would turn out motor cycles at $150 each, when anyone knows that the motor alone could not be bought or built for anywhere near such a figure. The public, knowing but little of the new industry, is unjustly deceived by such gullible statements and every such foolish story adds so much more to the trouble which a motor salesman has in showing why his goods have to be sold at figures that seem preposterous to buyers, who insist on comparing them with bicycles.

BOOMING MOTOR BUSINESS

New York, March 10.—Rival motor vehicle makers in this city are making every effort to boom automobiles in the business districts, especially in the Wall Street neighborhood, where are centered the very rich concerns. On the main floors of big office buildings adjoining the halls, which are great and constant thoroughfares, are to be seen the booths and show rooms of motor vehicle makers. For instance, the Locomobile Co. of America has its show room in the Empire building, near the approach to the elevated railroad station, while the Winton people show a carriage in the main rotunda of the Equitable.

In addition to this, automobiles are seen, evidently with intent to keep them on view, in front of the buildings where are the offices of the companies. It is a good line of advertising, as crowds constantly cluster about them eager for information from the driver in charge.

WOODS INVADES NEW ENGLAND

Boston, March 10.—The Woods Motor Vehicle Co. of Chicago, which is the parent company of several incorporations in the large cities, has branched out into New England, where the Boston Woods Motor Vehicle Co. has just been incorporated under the laws of Massachusetts, which fact means that all the capital stock of $300,000 has been paid in.

Under the charter from the state, the shares must have a par value of $100 each, and the company is allowed to act as a common carrier of parcels, mails, baggage, money, merchandise and freight by means of 'busses, cabs and wagons, and to establish and maintain plants or stations for the storing and equipping of such vehicles.

Samuel L. Powers is president, Henry W. Mason treasurer, and Frederick J. Crolius is the third incorporator. The annual meeting will be held Tuesday afternoon next.

BOSTON CAB CO. STOCK

The New England Electric Vehicle & Transportation Co., in circulars to stockholders under date of March 7, states:

"The New England Electric Vehicle Transportation Co. has on hand a sufficient portion of its capital subscribed to meet all the requirements of its business for some time to come, and it is thought that a large proportion of the stockholders of the company would prefer to have their present holdings of shares fully paid rather than have them assessable by vote of the board of directors. If, in the future, the development of the business requires additional capital, it is always in the power of the corporation to increase its capital stock, giving the stockholders the right to subscribe for the same, but without imposing any obligation on them to do so. The directors, after a full consideration of the matter, and consultation with some of the leading shareholders, have voted in favor of the decrease.

"When the company was formed, twelve fully paid-up shares were subscribed for by the original incorporators, and it is deemed best to purchase and retire these shares so that hereafter all stock will be on the same footing.

"The directors have voted that it is advisable to decrease the authorized capital stock of their said company from $25,000,000, divided into 250,000 shares of the par value of $100 each, $5,000,000, divided into 500,000 shares of the par value of $10 each, the said decrease in the authorized capital stock of the said company to be effected by reducing the par value and increasing the number of shares as aforesaid, and by purchasing at par the original twelve shares of fully paid stock of the company of the par value of $100 each by issuing

from the unissued stock in lieu thereof and in payment therefor 120 shares fully paid of the par value of $10 each.

"Stockholders will vote upon the question on April 3."

A MARLBORO VEHICLE

The Marlboro Automobile & Carriage Co. of Marlboro, Mass., has completed its first vehicle and it has been given a trial. The motive power employed is steam and the vehicle is similar in its construction to other vehicles of this type. The first carriage has accommodations for four passengers and weighs, ready for use, a trifle more than 900 pounds. The motor mechanism is entirely encased. The officers of the company are Orrin P. Walker, president; Ambrose M. Page, treasurer, and Frank A. Power superintendent.

NEW BUFFALO CONCERN

The Buffalo Electric Vehicle Co. has been incorporated under the laws of the state of New York. The concern has acquired the plant formerly occupied by the Burgess Arms Co. at Buffalo. F. A. Babcock, the well known carriage maker of Buffalo, will be the manager. Among the stockholders are a number of prominent citizens of Buffalo and Syracuse. For the present only one style of vehicle will be manufactured. The promoters claim that it will have an exceedingly large radius of travel on one charge.

CLEVELAND SHOWS WELL

Whitney Lyon, one of the governors of the Automobile Club, is enthusiastic over the result of his test of a new electric auto. In this vehicle, with only a single charge of the battery, Mr. Lyon was able to travel more than thirty-eight miles, and what pleased him all the more was the fact that the machine climbed the steep Fort Lee hill, says a New York daily.

The auto weighs 2,000 pounds. It is of two and a half horsepower, and has a storage battery of forty cells. Mr. Lyon started from the Waldorf-Astoria and proceeded to the Fort Lee Ferry. After crossing the ferry the machine had before it a test under which all other electrically propelled vehicles had failed. But this auto, to the astonishment of Mr. Lyon, took to the hill as if it were just what it was looking for. Only one or two steam power machines have been able to climb the hill, Mr. Lyon said.

Mr. Lyon and his companion continued north to Palisades Av., turning west into Englewood. After running around Englewood for a while the return trip was made to West Sixty-sixth St., this city. The number of miles covered was more than thirty-eight, and there was still enough current left for a trip to the Battery.

Mr. Lyon's vehicle is one made by the Cleveland Machine Screw Co.

The Goodrich Tire & Rubber Co. have opened a shop for the repair of their motor-vehicle and carriage tires, at 1557 Broadway, New York City, where they desire that all tires in service in the east be sent for necessary repairs. The repair department at the factory will be continued for western business. Charges on tires sent to either department should be prepaid and should have the owner's name and address attached.

The New York Automobile Co. of Syracuse has been incorporated under the laws of New York state with an authorized capital of $200,000 in common stock and $150,000 in seven per cent cumulative stock. The directors are Herman Bartels, Louis Will, Edward N. Trump, Ernest J. White, Arthur R. Peck, Frederick D. White and John Wilkinson, all of Syracuse.

The Billings & Spencer Co., of Hartford, Conn., have issued a circular illustrating their knuckle-joint forgings for the steering wheels of motor-vehicles. Detail drawings are given. The forgings are designed for vehicles of 600 to 1,500 pounds in weight.

The Chicago Automobile Co., which was organized some months ago for $1,000,000 by W. E. Donaldson, W. O. Worth and H. W. Kellogg, who have recently interested J. E. Keith, a former commission mer-

chant of Chicago, in the business and have elected him general manager. The company has purchased a plant at Harvey, a suburb of Chicago. They will build gasoline vehicles which are after designs of Mr. Worth.

The Baldwin Cycle Chain Co., of Worcester, Mass., show no less than ten different styles of chains for motor-vehicle use, comprising both block and roller types and a variety of sizes, capable of load up to $6,000 in the larger sizes.

Trustee Crabb disposed of the assets of the National Motor Co. of St. Louis on Monday last, but the Missouri Motor Co. is in a position to supply all old customers of the defunct concern, having secured the services of Inventor Hennegin.

Sad is the prospect for automobilism in Munich! There are now twenty-five vehicles there and the authorities, believing that that is plenty, have decreed that twenty-five is the limit on the number that will be permitted to be used.

The Sandusky (Ohio) Automobile Mfg. Co. has purchased the F. M. Underwood plant and the entire equipment, stock, drawings and patterns of the Ohio Gas Engine Co., of Bucyrus, which are being removed to the Sandusky plant.

J. G. Swindeman & Co., who are opening a large and elegantly fitted bicycle agency at 231 Superior street, Cleveland, announce that they are in the market for a good motor-vehicle agency.

The George F. Brandenburg Co. of Newark has been incorporated with an authorized capital of $50,000, to deal in automobiles. Mr. Brandenburg is interested in the Oakman Motor Vehicle Co. of Greenfield, Mass. This incorporation may have some bearing on the statement made by Mr. Hertel of the latter company, printed on another page of this issue of the Motor Age.

The Illinois Automobile Co. of Chicago has recently secured down town quarters in the five-story building at 47 and 49 Hubbard Court, into which they are now installing the business.

The Victor Motor Vehicle Co. of Indianapolis has been incorporated with an outhorized capital stock of $25,000, to manufacture electric, steam and gasoline motors for vehicles.

Rochester is planning to have a motor vehicle show for the purpose of promoting the trade. The show will doubtless be inaugurated with a parade of horseless carriages.

The request of the National Automobile & Electric Co. of Indianapolis for sewers, water mains and sidewalks to the site of their plant has been granted by the city authorities.

The Worcester and Bridgeport, Connecticut, papers are having a squabble about the location of the permanent plant of the Locomobile Co. of America.

Reports from Denver indicate that the New York Electric Vehicle Co. are making preparations for installing a cab service in the former city.

R. B. Fageol of Des Moines, Iowa, has constructed a gasoline vehicle and secured the financial backing necessary to put it on the market.

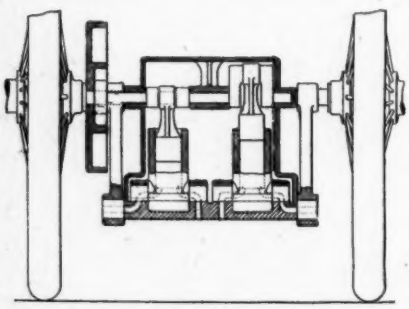
PROBLEMS WORKED OUT

PLAN FOR ADAPTING OSCILLATING ENGINES TO THE DRIVING OF AUTOMOBILES—AN EXAMPLE OF PATENT INTO WHICH ENOUGH MATERIAL FOR SEVERAL SEPARATE INVENTIONS IS CROWDED

OSCILLATING ENGINE SCHEME

Letters patent No. 644,598, to C. O. Heggem of Massillon, O.—This inventor aims at simplicity and contrives to adapt an oscillating engine to automobile driving. From the shaft of whichever pair of wheels to which the drive is applied are pivoted two arms, one adjacent to each wheel. These arms support the engine housing. Within the latter is a pair of oscillating engines hung on trunnions at the lower ends of the respective cylinders. Thrugh these trunnions run the inlet and outlet passages for the driving medium. Exterior and interior ports are arranged to match.

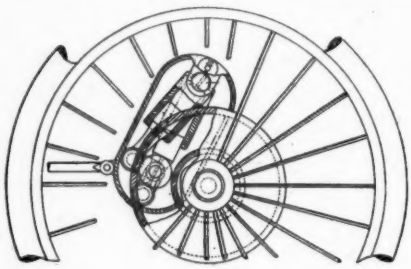
Near the upper end of the housing is mounted the motor crank shaft, one end of which extends outside the housing that it may drive the friction clutch attached to the wheel axle. This clutch comprises a disc with two annular, concentric flanges between which rotate a friction roller mounted on the end of the engine shaft. This may be made to engage frictionally either the inner face



Heggem Oscillating Engine.

of the outer flange or the outer face of the inner flange. The machine may be thus driven forward at one speed and rearward at another.

The shifting of the friction driving roller is accomplished by swinging the entire engine housing backward and forward upon its supports at the lower ends of the depending arms upon which it is pivotally mounted. This is done by means of a pitman hinged to the upper



Heggem Oscillating Engine.

end of the housing and running forward underneath the vehicle body to connect with a lever in reach of the operator.

The inventor does not specify the character of the driving medium to be used in the engines, stating merely that they may be driven by steam, compressed air or gas. Conducting and exhaust connections are to be arranged to suit the medium adopted.

The inventor suggests filling the housing with oil to insure constant and perfect lubrication for the oscillating engines. The number of engines is not limited, this feature being determined by the purposes and requirements of the vehicle to be driven.

Mr. Heggem does not speak of any differential for the drive shaft and so, as he states that the driven member of his friction drive clutch is secured to the wheel axle, it is probable that he intends to use but one traction wheel, the other wheel on the axle being independent in its revolution. The driving clutch may

be made in the form of a spur gear clutch if desired.

FRANTZ'S COMPREHENSIVE PATENT

Letters Patent No. 644,590, to H. A. Frantz of Tamaqua, Pa.—The history of the bicycle industry is apparently being repeated in the motor vehicle industry patents. Early bicycle inventors covered, or tried to cover, in one patent a great variety of mechanical features throughout the construction of a machine. The patents were complicated, the drawings many, the claims long, small points were buried beneath a mass of description intended to link intelligently every detail in the entire construction of a bicycle.

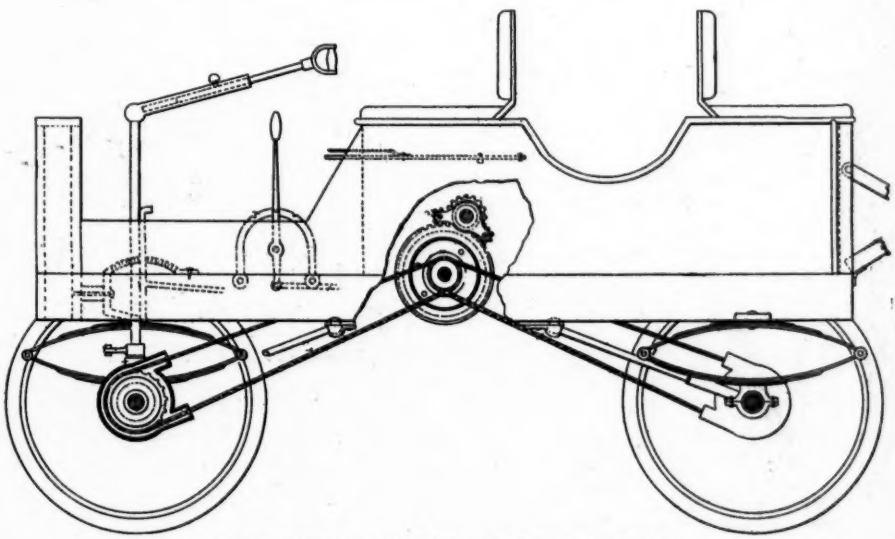
The motor vehicle patents now being issued show in many cases a tendency toward the same style of patent, and the natural added complication of an automobile over a bicycle adds materially to the complication of the patent specifications and claims. Lumping of many ideas into one patent lowers the value of the patent.

The simpler the patent claim is the greater value it possesses. It may be stated conversely that the more obscure a claim is the less it is worth as a commercial protection for mechanical thought. Then, too, the doubling-up scheme is detrimental to the whole industry as well as to the welfare of the individual inventor. In many a complicated patent whose principal points are valueless commercially is hidden some idea which is never brought to light until in after years common use of the same thing leads to its discovery and it becomes the basis of costly litigation and attempt at individual gain from an entire industry.

The patent sheets of the Frantz patent furnish an excellent example of this department store lumping of ideas. This patent covers frame support, plan of power transmission from drive shaft to wheel shafts, construction of the divided axles and differentials used, constructions of the steering knuckles, steering gear and speed change and drive reversing gear. It short it is the entire construction of the motor vehicle, minus the motor, covered by one patent.

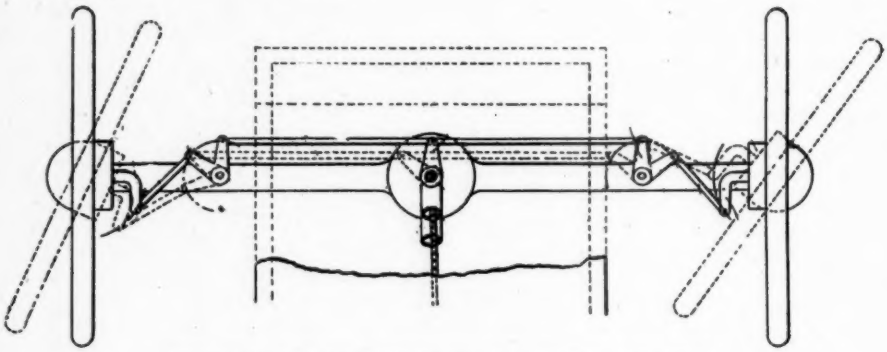
The illustrations herewith presented are reproductions from these views on the five sheets of drawings which show the more salient points of the invention.

The wagon body is mounted on springs supported in each instance by boxes enclosing the respective wheel shafts. Each axle is driven by a chain running from sprockets on the motor countershaft, which is approximately in the longitudinal center of the body. Extending from



ELEVATION OF THE FRANTZ MOTOR VEHICLE.

the wheel shaft casings are four brace rods, two for each axle and each running approximately in the same direction as the drive chain to its axle. The brace rod is secured to the under side of the vehicle body in each instance by means of a small bracket affording a seat for a ball and socket universal joint. Thus when the wheel axles move upward and downward in their relation to the vehicle body the swing of the brace rods will be substantially the same as that of the chain runs and will thus accommodate such relative movement of wheels and body without any but slight change in the tension of the chain.



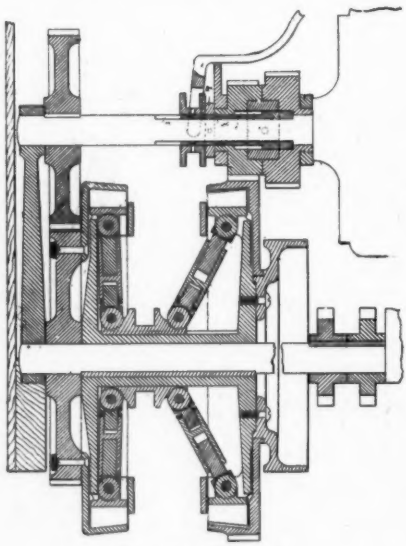
STEERING DEVICE ON THE FRANTZ MOTOR VEHICLE.

The second part of the invention relates to the connection of the driving chain to the divided axles and to the arrangement of the differentials. The latter comprise ordinary bevel gear devices such as used commonly for the purpose. The gear set is mounted within a casing to whose outer periphery is secured the chain sprocket. The axles being covered by a sleeve the latter is connected at the division by means of a spherical box covering the differential housing and provided with openings for the chain runs. This feature is not here illustrated.

The third item relates to the steering knuckles which are enclosed within an enlarged hub and furnished with roller bearings for the wheel. No illustration here.

The fourth item is the arrangement of the steering gear. This is shown in the illustration presenting a plan of the forward end of the vehicle. The steering lever post is fitted with a short crank operating the cross rod. This connects at each end to a bell crank which in turn is connected through a short link to the bell crank of the steering knuckle.

The action of the bell cranks is such, on account of their respective angles and arrangement, that they prove more effective when throwing the front side of the wheel away from the vehicle than oppositely. Thus in operation, no matter which way the wagon is being turned, the wheel on the inside circle of the turning curve will assume a greater angle to the vehicle body than the other and outer wheel. Thus each wheel is made to turn correctly relatively to the



Frantz Speed Change.

other that each shall be constantly at right angles to the turning radius of the curve being described in turning the vehicle.

The remainder of the invention relates to the speed changing and drive reversing mechanism at the central motor shaft. This device is shown in cross section in the detail view herewith and also in the elevation view of the vehicle. The motor counter shaft is driven from the motor shaft by a tight and a loose spur gear. The latter, which is on the counter shaft, may be brought to rigid relation with that shaft by means of a friction clutch, shown in the sectional detail illustration. This clutch is operated by a sleeve with an annular groove engaging the operating lever.

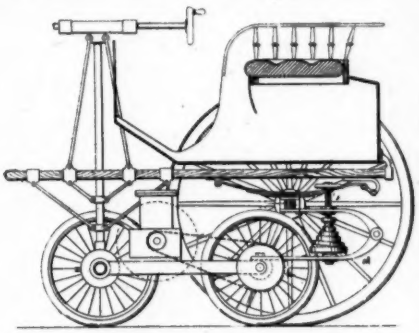
The other side of the clutch is arranged to bring into driving action the lower speed gear, one gear clutch releasing simultaneously with the throwing on of the other. The low speed and reverse gear comprises a pair of spur gears one of which is adapted to engage directly the counter shaft gear.

It and its mate are also keyed to the motor shaft that the former may be shifted out of engagement with the countershaft gear and two idler pinions meshing with the other brought into mesh with the driven gear. This shifting accomplishes the drive reverse. Its operation is by means of a small lever independent of the speed change lever. The inventor was allowed ten claims.

FIFTH WHEEL FOR TRACTION

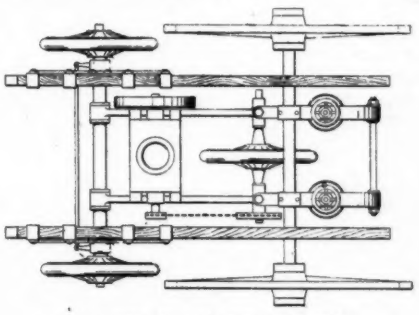
Letters Patent No. 644,950, to J. E. Thornton and J. P. Lee of Altringham, England.—The Hicks scheme for utilizing a fifth wheel for the purpose of traction and regulating its load according to the work to be done by it as a traction wheel is developed in a somewhat similar manner by the five wheeled vehicle of these two Englishmen.

The traction wheel is nearly central of the vehicle and is driven direct from the motor shaft. Its connection to the vehicle is by means of swinging arms from the front wheel shaft and a pair of curved, jointed arms on each side at the rear. Between each pair of these hinged supporting arms is a strong spring whose tension is regulated by a screw and hand wheel. If desired on account



Elevation Fifth Traction Wheel Vehicle.

of the type of vehicle body the traction wheel support may be reversed and the longitudinal supporting arms run to the



Plan Fifth Traction Wheel Vehicle.

rear axle instead of the front. In either instance the motor is placed on these arms. The patent application was made in 1897.

STEERS WITH THE MOTORS

Letters patent No. 644,853, to Eugene Fahl of St. Louis.—Mr. Fahl does away with direct steering gear and contrives to steer the vehicle by the relative action of the two electric motors used to drive his vehicle.

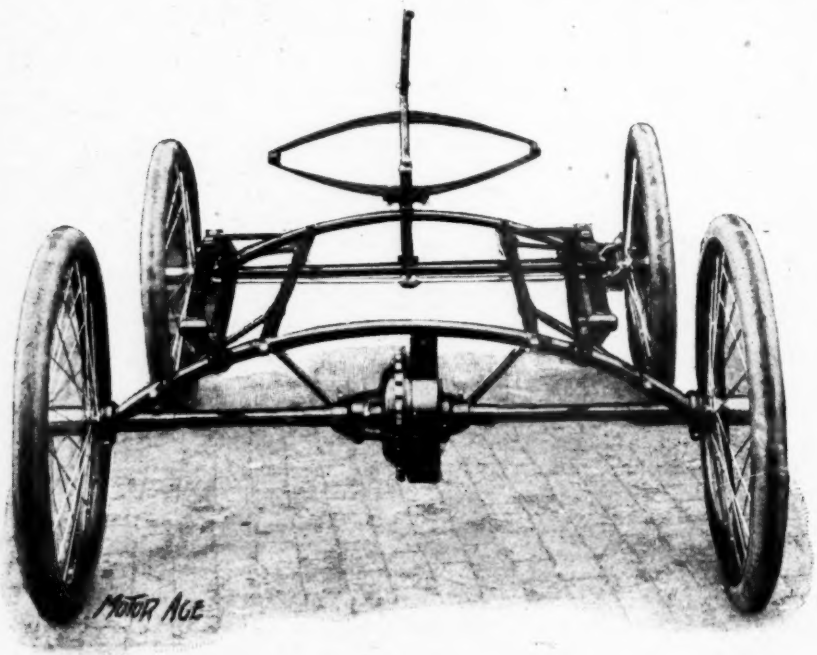
The front wheels are hung on spring supports whose vertical turning centers are ahead of the axis of the wheels, thus adapting the latter to act as trailers to follow the direction of the vehicle as given it by the driving wheels. The latter are each mounted on an independent, rigid stub axle and each is driven by an independent electric motor.

The rheostat lever of each extends in

crosswise direction toward the center of the vehicle. A link connects the end of each lever to the respective ends of a short cross arm near the lower end of a vertical actuating rod to whose top are secured the operator's handles. This rod is arranged for both a turning and a swinging motion. Thus when its upper end is pushed forward by the driver the cross arm will move forward and carry with it both rheostat lever links, starting both motors in unison and at the same speed. When it is desired to make a turn the actuating lever is turned one way or the other and one rheostat lever changed in its relative position to its mate, the speed of one motor increased over that of the other and one driving wheel revolved faster than that on the opposite side of the vehicle.

COMPLETE RUNNING GEAR

The accompanying illustration gives an excellent idea of the running gear for motor vehicles that is being marketed by Pratt Bros., of 36 Dearborn street, Chicago. As will be seen by reference to the cut, the design is symmetrical and well calculated to assist in giving a handsome appearance to any vehicle of which it forms a part.



The frame is of seamless steel tubing of twelve, fourteen or sixteen gauge and all connections are made of drop forgings. The front axle is fitted at either end with the usual knuckle joints for accomplishing the steering. The rigid portion of this axle is built into the frame. The front and rear portions of the frame are connected by tubular reaches, connecting the arched braces over the axles, and made extra strong to withstand the

strains to which they are subjected. To relieve the strains at the joints, supplementary braces are run from the axles to the reaches, as shown in the illustration.

The springs are mounted in the usual manner, ready for the reception of the body. A steering lever is provided, ready for use after the addition of a handle or grip to give it a finished appearance.

The rear axle is provided with a differential gear, a pulley for band brake and a sprocket wheel for chain transmission. The split axle is reinforced by a flat steel yoke surrounding the differential gear and two tubular braces at either side, connecting the axle with the curved brace above.

The rear axle is mounted on ball bearings and is carried in a casing built in the frame. All bearings are adjustable and all nuts and bolts are nickel plated as are spokes, nipples, hubs and connecting rods.

The running gear is, in short, entirely ready for the fitting of the motor and body.

THE BELGIAN DURYEA CARRIAGE

In describing the Belgian Duryea motor vehicles, for which they control the patents in Belgium, the "Construction Liegeoise d'Automobiles" make the claim that their carriages are no more noisy than the electrics and that they are practically without vibration, whether the vehicle be under way or the engine be running idle while the vehicle is at rest. The supreme test of a motor vehicle in America, says the company, is its ability to climb hills, and the Duryea, having passed muster on this score in the home of its birth, can certainly not be wanting on European roads.

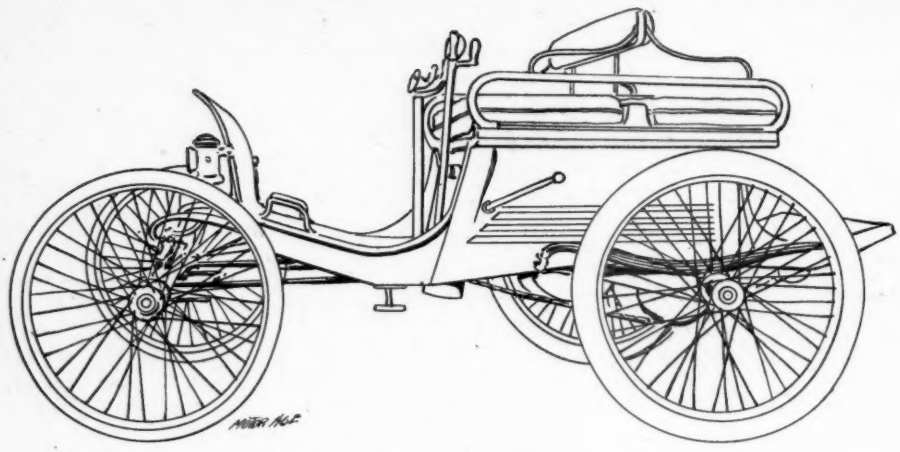
The most popular type of vehicle marketed is a dog cart, fitted with twenty-eight and thirty-inch wheels, 2¾-inch tires, and ball bearing axles, setting so close to the ground that it is particularly easy of access by ladies. There is one seat, with an additional removable rear seat. The seats are so wide that they will readily accommodate two adults and one child. The weight is 840 to 880 pounds. The mechanism is described by the makers substantially as follows:

The gasoline motor has two horizontal opposed cylinders with cranks set at 180 degrees on the same crank shaft, on which are also carried the fly wheel and speed change gears. The piston rods and cranks are enclosed in a chamber containing an oil bath. The piston rods, as will be seen by reference to the accompanying cut, are hollow, the space being utilized as an oil reservoir to lubricate the crank pins and piston connections. The speed of the motor is low, not exceeding 400 revolutions per minute, thereby saving wear on the working parts. The ignition is constant, the speed of the motor being regulated by the quantity of the explosive mixture admitted, which is controlled from the seat by the pressing of a button on the steering lever, a very handy arrangement.

The carburettor is not fully described, but heat is furnished by the exhaust, and the claim is made that gasoline of varying degrees of volatility can be used without interfering with the efficiency of the carburettor.

The water cooling of the motor is effected without the use of a pump. There are two reservoirs, one at either side of the carriage. It is claimed that a single pailful of water is all that will be consumed in a run of 100 kilometers (62½ miles). The water jacket is so constructed as to be easily removable, in order to permit the removing of deposits left by the water, an important item, inasmuch as such deposits interfere greatly with the proper cooling of the cylinder.

The ignition is furnished by electricity, generated by a dynamo driven by a pulley actuated by the fly wheel. The dynamo, it is claimed, will furnish a spark



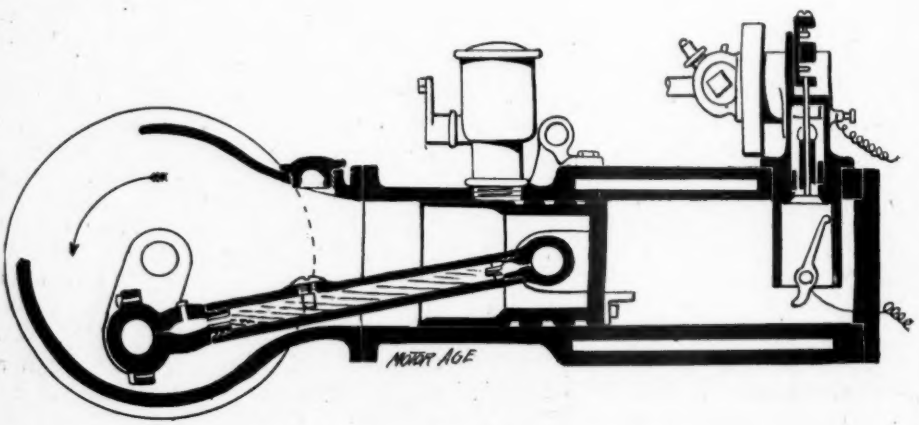
BELGIAN DURYEA MOTOR-CARRIAGE.

immediately, obviating the necessity of the use of batteries of any description. To prevent the dynamo running at too high speeds, a centrifugal governor is fitted which permits the actuating pulley to run free when the dynamo reaches a speed of 1,500 revolutions per minute. A very hot spark is obtained at the moment of greatest compression. The current is reinforced by an induction coil, introduced without the use of a trembler.

Independent of the oil reservoirs in the piston rods there is an oil reservoir for the constant lubrication of the pistons.

The vehicle is provided with two forward speeds, controlled by one lever, and a reverse speed controlled by a pedal. The speed changes are accomplished by means of gears which are always in mesh. The speed change gears allow of almost any speed between six and nineteen miles an hour, in connection with the change in speed of the motor. Speed engagement is effected by clutches, avoiding all sudden jars in starting or increasing speed.

The steering is accomplished by a hand crank at the right of the driver and is rendered easy by the stub axles of the



MOTOR OF BELGIAN DURYEA MOTOR-CARRIAGE.

steering wheels being set at an angle in the knuckle joints. The carriage will continue in a straight line when the driver has no hold on the steering lever.

Access to the motor can be obtained without the removal of a single bolt or nut. A single wrench is all that is necessary to take the entire mechanism apart.

The price of the vehicle, as shown in the illustration, with a removable rear seat and all tools and accessories, is $1,200.

NEW YORK NEWS LETTER

GOOD ROADS CORFERENCE COMES TO NAUGHT—MOTOR VEHICLE SHOW ASSURED BY LEASE OF MADISON SQUARE GARDEN—LIMITING HORSEPOWER OF MOTOCYCLES IN SPEED CONTESTS

New York, March 10.—The good roads conference last Saturday between the New York division executive committee of the League of American Wheelmen and A. R. Shattuck, representing the Automobile Club of America, failed in bringing about co-operation for the present between the wheelmen and the chauffeurs, each side being reluctant to play second fiddle to the other. Both, however, are doing excellent work and perhaps can accomplish as much by independent effort.

Two men very prominent in automobilism and cycling were recently included in one day's police round-up of too speedy motor vehicle drivers. Albert C. Bostwick, chairman of the committee of the Automobile Club of America having in charge the challenge for the international cup and of the coming automobile show at the garden, was gathered in on Fifth Avenue and had to put up cash security for his appearance at court.

Sidney B. Bowman, the well known cycle dealer and old time racing man, was homeward bound up Eighth Avenue on a motor tricycle. Hailed by a cycle cop to slow down, the thought struck him to test the going qualities of his new toy, so he pulled the throttle wide open and let her go for all she was worth. Copper No. 1 was quickly distanced. Ten blocks further up Copper No. 2 gave chase, only to be as easily dropped. Then Copper No. 3 swung in for the homestretch. Bowman reached the goal of his front door step a block to the good and gave cash bail at the station house with a feeling that he had at least a good run for his money.

When the day of the motor cycle policeman comes then there will be fun; but cycle cops are too easy marks at this stage of the game.

That there will positively be an automobile show at Madison Square Garden and the date thereof has been settled by the governors of the Automobile Club of America, who this week authorized the lease of the garden from Saturday, November 3, to Saturday, November 10. Already the announcement that prizes would be offered for starting, stopping, turning curves and hill climbing has, at the very jump, interested both riders and makers.

The foreign manufacturers are likely in the early years of automobilism in this country to take advantage of their temporary further advancement in the new art to make hay while the sun shines and make a bold bid for the American trade. This will probably lend to the proposed shows next autumn considerable of an international aspect.

There have been rumors that the site of Madison Square Garden was to be sold to the government for an uptown postoffice, but they have been proved to be without foundation and so the automobile club enters upon its proposed scheme with no doubtful obstacle of this kind in its path.

In addition to race meets on trotting tracks for automobile and motor cycles

exclusively, it is probable that most of the big bicycle meets will have one or more motor cycle races on the program. Well known bicycle racing men are buying racing tandems and singles as fast as they can be turned out, so as to go after the considerable prize money in the aggregate likely to be put up. It is proposed to limit the horse power of the motors in some of the races, the average probably being 2½ horse power. If this is done riders will be compelled to certify to the horse power of their motors and be subjected to severe penalties by the N. C. A. board of control in punishment for any false certificates that may be given.

Albert C. Bostwick, who is chairman of the committee in charge of the coming show of the Automobile Club of America and will represent the club at the race for the Gordon-Bennett international cup, expects to take part in some of the smaller races abroad this summer. He is a great motor vehicle enthusiast, having no less than four automobiles and motor cycles in his stable. In fact, he was speeding an Orient autogo when arrested the other day.

The Automobile Club of America has in contemplation and actual preparation a monster run to Philadelphia in April. It is proposed to start on a Saturday and spend Sunday touring around the Quaker City suburbs with some such hostelry as Rose Inn as headquarters.

In preparation and by way of a trial trip will be the preliminary run the end of this month to Tarrytown, returning by way of Portchester, a total distance of seventy-five miles.

The Automobile Club of America is to have a beefsteak dinner next Tuesday in true bohemian style at a rathskeller near the St. Nicholas Rink storage and charging station. The invitations, gotten up by Whitney Lyon, chairman of the house committee, are printed in antique style on brown wrapping paper and worded in wittily appropriate style as follows:

"It is the desire of the House Committee of the Automobile Club of America that you lend your assistance on Tuesday evening, March the 13th, at seven o'clock, to force an entrance to the Dungeon of one Healy, on the corner of Columbus Avenue and Sixty-sixth Street, taking possession of the same, and demanding of the said Healy an informal Beefsteak Dinner, to be served in true Bohemian style. Come with an M. T. gasoline tank and dry bearings, as ample opportunity will be provided to fill up and lubricate. Believing that there are times when it is the duty of each chauffeur to put down beef, as well as horse flesh, you are invited on this occasion to put down as much of it as you think you can comfortably hold. Radiating coils and water jackets will not be needed as specially chilled Pilsener and Wurtzenberger cooling fluids have been imported from Germany for this occasion. If you are desirous of joining the attacking party, kindly return, 'Top Speed Ahead,' the enclosed card together with three dollars, the price of subscription, which includes everything. Whitney Lyon, Chairman House Committee."

MINOR NEWS AND COMMENT

AT THE PARIS EXPOSITION

One of the departments of the Paris exposition coming under the general class thirty, will be a general display of vehicles in use from the year 1801 up to the present time. This department is under the direction of M. Manceaux-Duchemin and is located in the Champs de Mars. There will be displayed the various types of vehicles that have been seen in France during the passing century, including carriages, wagons, automobiles, bicycles and locomotives. Side by side will stand diligences, stage coaches. tourists' carriages, wagons, and primitive locomotives, velocipedes, ancient bicycles and early automobiles, fraternizing, in their rust and the deshabille

of time, with the elegant and luxuriously equipped vehicles of modern days.

They will afford the visitor the opportunity for making curious comparisons and a study of the history of locomotion. The old-fashioned vehicles, picturesque in their antiquity, have the further charm of being known to be just what they purport to be, as the committee of selection is composed of men well posted and reliable.

Among these vehicles will be found a carriage of the first empire which was formerly in the ethnographical section of the Trocadero Musee. This carriage will be equipped with fine specimens of horses and attendants in uniform—stuffed, it is scarcely necessary to say.

There will be relics of the various railway cars and locomotives, which will, for the most part, be furnished by the companies to which they belong, having been carefully preserved, as is fitting that the respectable ancestors of the modern locomotives and railway carriages should be preserved.

Marine transportation will also be represented, ancient sailing vessels being shown in model, as well as the earlier steam barges, one taken from the museum of the Louvre. Last but not least is the department devoted to cycles and automobiles. There will be an assortment of Draisenes, bicycles of wood and of iron, long ones, short ones, small ones and large ones, with wheels of all styles, in the order of their successive transformations, down to the latest model of 1900.

The automobiles will be seen in quaint and curious forms, beginning with the first steam tricycle made by the Compte de Dion, the first voiturette of Serpollet and the first road wagon of Bollee.

M. Duchemin, the organizer of this transportation department, has taken care to see that there is a complete exhibition of modern vehicles in the section reserved for the showing of contemporaneous industries.

The flying machine, alas, will be given no place in the exposition.

In addition to the exhibitions of ancient and modern samples and models of means for locomotion, there will be an elaborate collection of books, prints, engravings, photographs, bas-reliefs, medals, and all sorts of reproductions on paper and in metal of the old time vevicles, as well as models and wax figures showing the costumes of all the periods of the century, down to the bicycle rider and chauffeur of to-day.

WASHINGTON SPEED REGULATIONS

Washington, D. C., March 10.—In view of the numerous complaints that have reached police headquarters of late regarding the dangerous speed at which it was alleged some of the automobiles were being operated along the streets, the superintendent of police has instructed the members of the force to rigidly enforce the recent regulation governing the speed of vehicles in public thoroughfares. The regulation in question provides that no automobile or other horseless vehicle shall be propelled across any intersecting streets on which there are car tracks at a greater speed than six miles an hour, nor at a greater rate of speed between intersecting streets and avenues or cross streets on which there are no car tracks than twelve miles an hour. Outside the city limits the rate of speed must not exceed fifteen miles an hour.

A VICTORY FOR MOTOR VEHICLES

Motor-vehicles gained a point at a recent meeting of the park commissioners of San Francisco. The ordinance excluding them from the park was modified to admit them on the south drive, commencing at Waller and Stanyan Streets and thence to the ocean beach. The speed must not exceed eight miles an hour. In time the new vehicle will be admitted to all parts of the park.

The first automobile club in the west was organized last Wednesday at the Cliff house. It is known as the Automobile Club of San Francisco, and its object is to promote the use of horseless carriages and the improvement of streets and roads.

Hermann Oelrichs, A. G. Wieland, Adolph Spreckels, James M. Wilkins and Byron Jackson are the promoters of the club. In response to a telegram Hermann Oelrich has received from Superintendent Clausen of Central park, New York, a

statement of the conditions under which automobiles are admitted within that park.

DEATH OF HERR DAIMLER

Recent reports from Germany announce the death at Connstat of Herr Daimler, the "father of automobilism." Herr Daimler was an associate of Otto in the perfecting of the gas engine and was the first to apply this type of engine to the motor-vehicle. He was the first, in fact, to place practical automobiles on the road and was the founder of the present business in self-propelled carriages. The Connstat-Daimler vehicles are sold in all parts of the world and are conceded to be among the best that have been offered to the public.

ACCIDENT AT THE CAPITOL

Washington, D. C., March 10.—The unusual spectacle of an automobile running in zig-zag fashion across the sidewalk on G Street was witnessed last week. The vehicle belonged to a prominent citizen, who left it for a moment to make a purchase in a nearby store, leaving his wife seated in the vehicle. In some way the lever which starts the vehicle became unfastened and the carriage began to run along the sidewalk, the sole occupant being unable to manage it. It finally wound up against the side of a house, causing the lady to be thrown out, while the vehicle sustained considerable damage. This is the first accident of the kind that has yet occurred in this city.

The record list of the cyclists is due for a complete wiping out this season at a very early date. The increased speed of the motor pacing machines will do the work at an early date and improvements will aid in increasing the breaks from time to time.

Charles W. Miller, the long distance rider, now with Joe Judge a member of the leading motor cycle team of last season, has a chip on his shoulder and will accept the defi of Frank Waller for a match tandem race at Louisville in the spring with a side bet of $250. Miller, Judge and Stone will again be associated this season and will pick up a fourth member for the party to operate the two machines belonging to Miller.

One of the first record attempts of Albert Champion, the French motorist, will be from Boston to New York to break the seventeen-hour record of Kenneth Skinner on a motor tricycle. Champion will be paced throughout and will be provided with relief motors at all points.

Chicago's automobile examining board has, finally, accomplished the task of examining all applicants for licenses to run automobiles in that city, and has granted licenses to all who have applied for them, with one exception. This license was withheld on account of lack of experience on the part of the applicant in handling motor vehicles.

Big Joe Grimes has not given up his intended record trip from the Atlantic to the Pacific in an automobile. Grimes was at the New Haven cycle show some time ago and while there said that he had several chances, one of which would probably be accepted. Grimes weighs 561 pounds, but declares the weight no hindrance in the operation of a motor vehicle. In support of his statement he cites his success in the Munich-Berlin contest last season, in which he finished seventh in a field of twenty-three and but twenty minutes back of the winner.

Track owners will this season place a limit upon motor cycles of 2½ horsepower and upon motor pacing machines a limit of twenty-one inch displacement. The motorists who have spent the winter scheming to get out the fastest machines protest against this and say there should be no limit other than the speed of the track and the daring of the riders themselves. Some track owners support the motor men in this and the public will naturally wish to see the limit of speed reached and also the limit of daring, as it is for that they spend their money.

Protecting Strips.

Felted Rims
FOR
Pneumatic Tires

The annexed cut illustrates the application of a protecting strip on the edge of Rims, as a protection to the Pneumatic Tire, preventing the wearing or cutting of the outer edge of the Tire.

Price List and Particulars on application to the

Colonial Automobile Co. 32 Hawley St., BOSTON, Mass.

USERS OF MOTOR-VEHICLES

Are invited to contribute letters giving experiences of interest, trips, tours, etc. Questions concerning any feature of motor-vehicles will be carefully answered. Address, The Editor, The Motor Age, 324 Dearborn St., Chicago.

A BRITISH SYNDICATE desires the *exclusive agency for Great Britain* for one or more fully-developed

Motor Vehicles

preferably of the *gasoline* type.

Would consider nothing of an experimental nature or made by a concern unable to *guarantee prompt shipments.*

Headquarters in London.

Address preliminary correspondence to

SYNDICATE,
Care Motor Age,
Monon Bldg.,
Chicago.

Gasoline Engines!

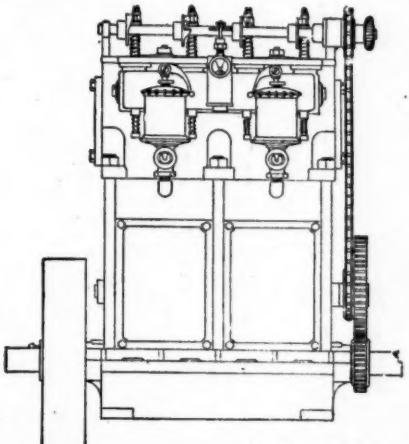
OPPOSED CYLINDERS,
BALANCED TYPE.

Latest, Most Compact Design for Vehicles & Launches 4 to 12 B. H. P. : Blue Prints, $1.

A. W. KING, 71 W. Jackson St., Chicago, Ill

The Motor Age is the most liberally quoted by foreign Motor Vehicle papers of any American publication

That Means Merit



This cut shows our four cylinder, 4½ horse power, non-vibrating, shifting spark, varying the speed from 100 to 1500 revolutions,

Gasolene Vehicle Motor

which we have demonstrated to be the most practical power in the market, occupying a space of 18 x 20 inches, manufactured upright or horizontal; weight, 175 pounds. We build from one to eight horse power. For vehicles, boats and light stationary work, we can prove superiority. Send for catalogue.

BUFFALO GASOLENE MOTOR CO.

Cor. Dewitt and Bradley Sts. - BUFFALO, N. Y

CONFIDENTIAL

PROPOSALS

ARE INVITED

for the various component parts of

100 GASOLENE VEHICLES

capable of carrying two persons over all kinds of roads and four persons over fairly good roads. Only the best of everything desired. Similar proposals invited for . . . .

100 STEAM VEHICLES

designed to be used for the same class of work. Correspondents will please give full particulars.

ADDRESS

JOHN CALDWELL

134 VAN BUREN STREET

CHICAGO